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Role of magnetic reconnection in accelerating particles in magnetically dominated turbulent plasmas LUCA COMISSO, LORENZO SIRONI, Columbia University — Magnetic reconnection and magnetized turbulence are often invoked to explain the nonthermal emission observed from a wide variety of astrophysical sources. By means of fully-kinetic particle-in-cell simulations of magnetically dominated pair plasmas, we investigate the interplay between magnetic reconnection and turbulence in generating nonthermal particle distributions with a power-law high energy range. Plasmoid-mediated reconnection, which self-consistently occurs in the turbulent plasma, controls the initial stage of particle acceleration. Then, particles are further accelerated by stochastic scattering off large-scale turbulent fluctuations. The work done by parallel electric fields associated with magnetic reconnection layers is responsible for most of the initial energy increase, and is proportional to the magnetization of the system, while the subsequent energy gain, which dominates the overall energization of high-energy particles, is powered by the perpendicular electric fields of turbulent fluctuations. The energy diffusion coefficient of stochastic acceleration scales as the second power of the particle Lorentz factor and linearly with respect to the magnetization parameter. The resulting acceleration timescale is very fast for highly magnetized systems.

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